Advanced Energy Design Guide: Small Office Buildings

(ASHRAE SP-102)

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Chm, SP-102 Cognizant Committee

Presented by

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Project Participants:

- Volunteer effort
- 11 person steering group
- 13 person writing team (SP-102)
- 5,000+ person-hours to develop

Goal:

- Present *a way, but not the only way* to build energy efficient buildings which use significantly less energy than those built to the minimum code requirements
- 30% energy savings when compared to ANSI/ASHRAE/IESNA Std 90.1-1999
- 50% and 75% documents to be covered later

Scope:

- Small Office Buildings
- Less than 20,000 sq ft using unitary equipment
- Use energy savings as the independent variable vs. cost effectiveness
- Use practical, off-the-shelf technology
- For use in addition to codes & stds - Is not intended to circumvent them

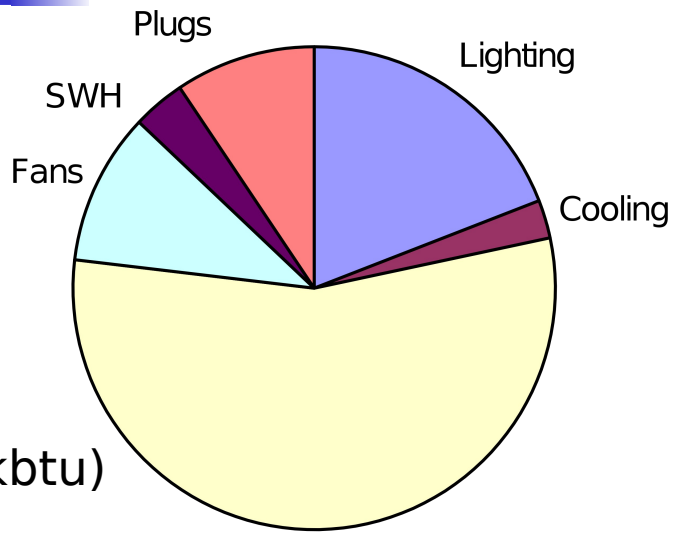
Objectives:

- Content: provide design strategies / choices and specific recommendations that achieve 30% energy savings relative to Std 90.1-1999
- Target market: contractors, design/build firms and designers involved in building small offices
- Format: document should be short, easy to use, and should contain “how-to” guidance
- Publication type: special publication, subject to peer review, not a standard or code
- Produce a useful document in a timely manner

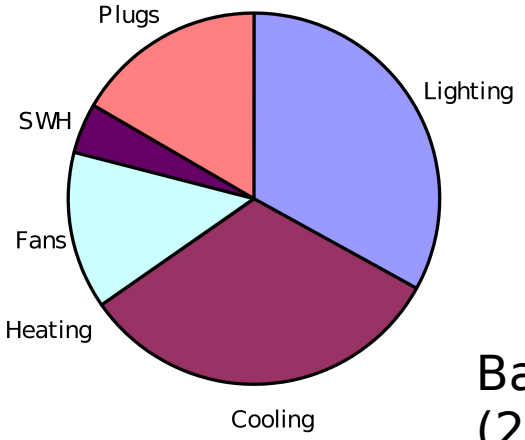
Document Contents:

- Introduction
- Integrated Process for Achieving Energy Savings
- Recommendations by Climate
- “How-To” Recommendations

Integrated Design Process:

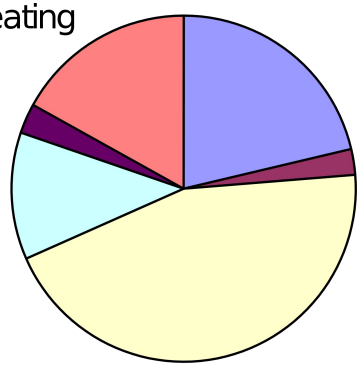


Base
(409 kbtu)



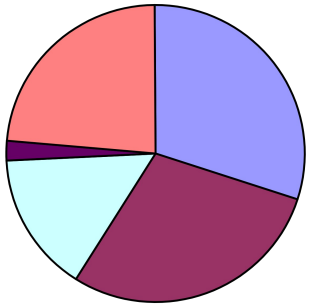
Base
(235 kbtu)

Dulut h



Advanced
(232 kbtu)

Miami



Advanced
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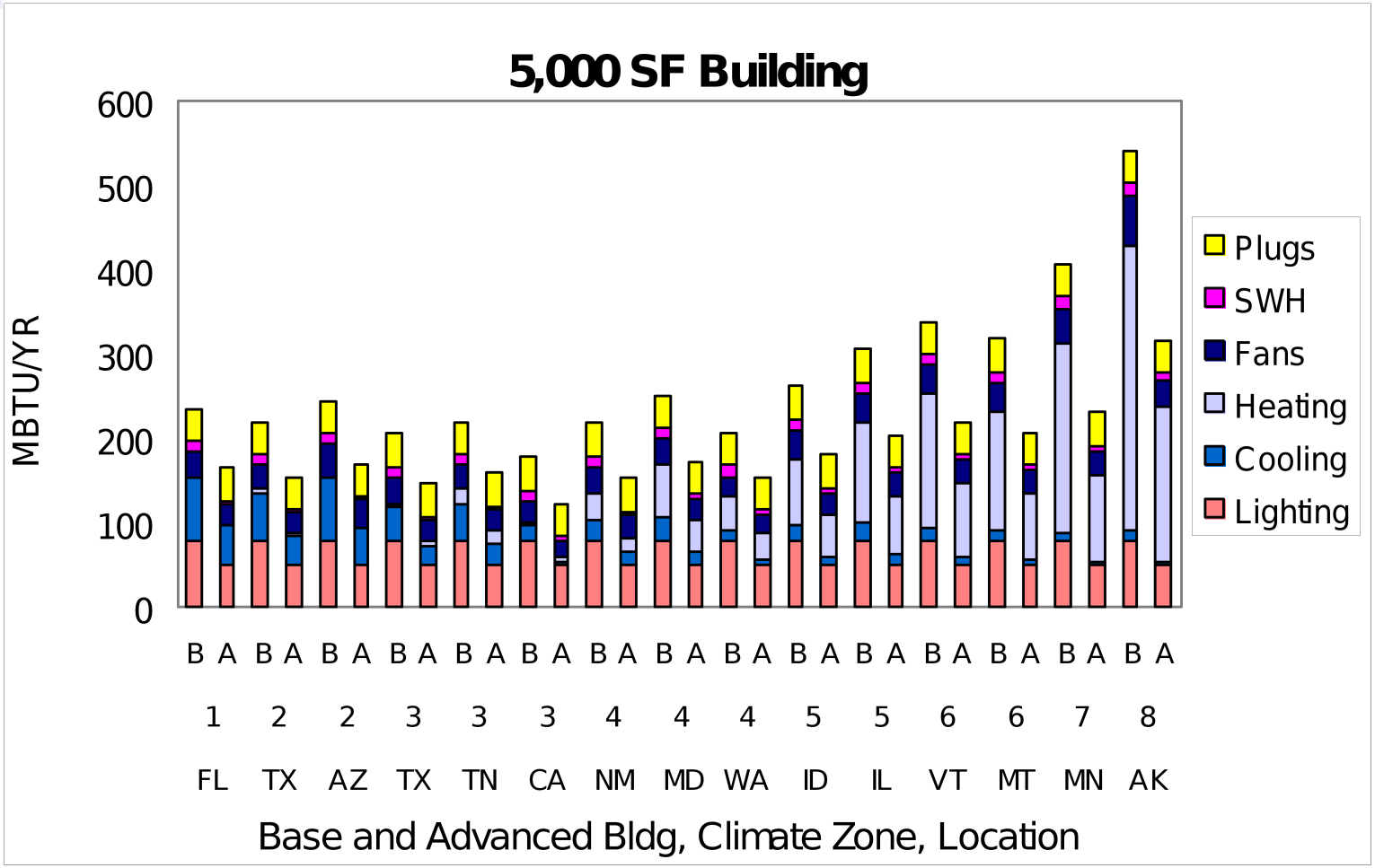
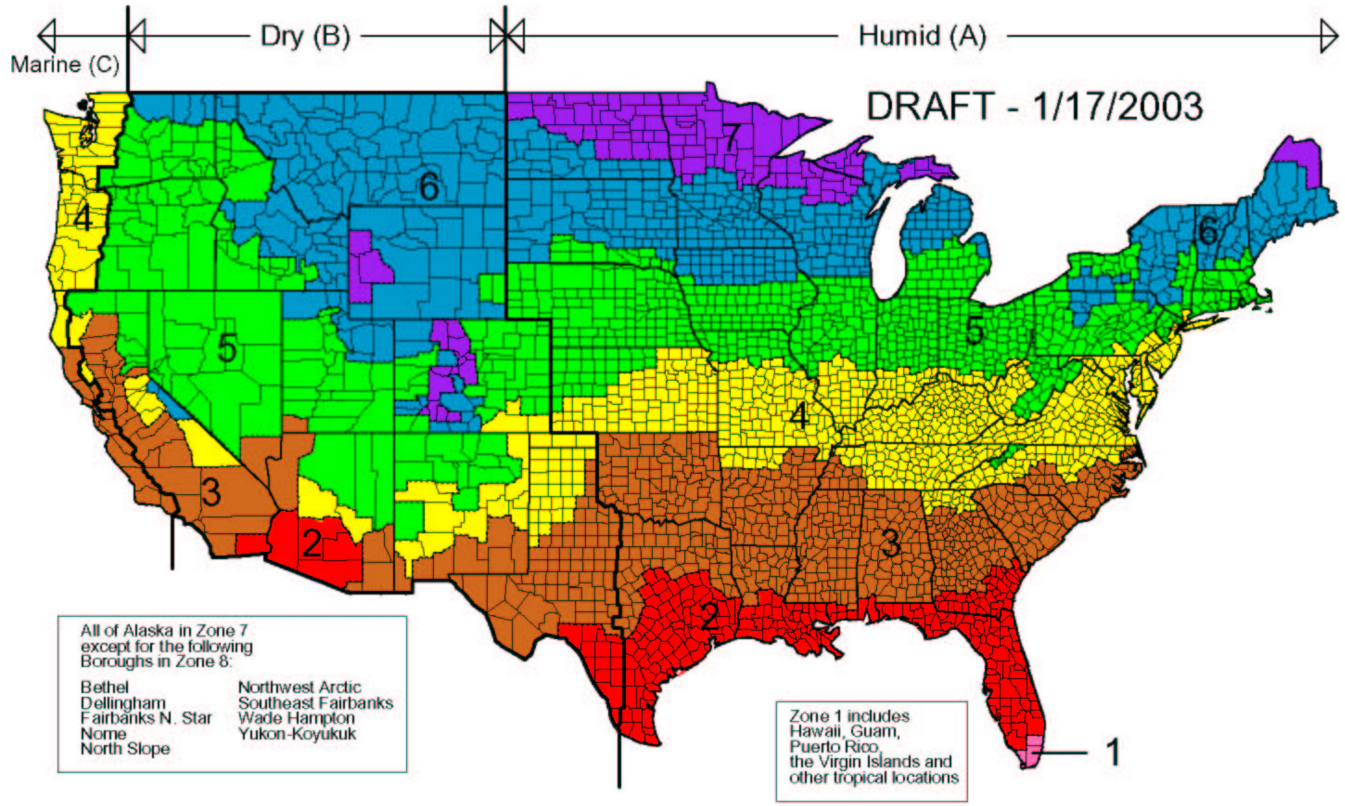
Integrated Design Process:


5,000 SF Building
MBTU/YR
600
500
400
300
200
100
0
B A B A B A B A B A B A B A B A B A B A B A B A B A B A B A B A B A
1 2 2 3 3 3 4 4 4 5 5 6 6 7 8
FL TX AZ TX TN CA NM MD WA ID IL VT MT MN AK
Base and Advanced Bldg, Climate Zone, Location
Plugs
SWH
Fans
Heating
Cooling
Lighting

Recommendations Tables

- Given by climate zone
- Combined energy savings based on “systems approach” where all recommendations are used
- Recommendations based upon many DOE2 simulations

Recommendations Tables
(Given by 8 climate zones)



Items Covered in Prescriptive Recommendations:

- Roof
- Walls
- Floors
- Slabs
- Doors
- Vertical Glazing
- Skylights
- Interior Lighting
- HVAC
- Ventilation
- Ducts
- Service Water Heating

“How-To” Recommendations

- Gives Good Design Practice – i.e. The “rules-of-thumb” and “should consider”
- Envelope
  - Opaque Envelope Components
  - Vertical Glazing
  - Window Design Guidelines
    - for thermal conditions
    - for daylighting
- Lighting
  - Daylighting
  - Daylighting Controls
  - Electric Lighting Design - Interior & Exterior

“How-To” Recommendations

- HVAC
  - Loads
  - Humidity Control
  - Energy Recovery
  - Equipment Efficiency
  - Ventilation & Exhaust Air
  - Ductwork
- Service Water Heating
- Plug Loads
- Quality Assurance

Publication Schedule:

- Initial Steering Group Meeting, Aug 2003
- Initial Working Meeting, Oct 2003
- Technical Content Approved, June 2004
- User's Group Review, June / July 2004
- Final Publication Now Available
- ASHRAE Journal Paper, Mar 2005

Additional AEDGs

- Additional 30% Advanced Energy Design Guides (AEDGs) for other building types are being planned
  - Retail/mercantile
  - Low-rise motel/hotel
  - Warehousing
  - Low-rise multifamily
- Other 50% and 75% Guides are also being planned

Summary Remarks:

- There is a demand for recommendations going beyond codes
- Need for giving guidance rather than requirements (i.e. “should” rather than “shall”)
- Performance vs Prescriptive
  - Complex interactions
  - Multiple ways to achieve goal